

FISH SURVEYS  
ON THE  
WASATCH-CACHE NATIONAL FOREST  
CONDUCTED DURING 1998

By

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## INTRODUCTION

During the summer of 1998 the staff of the Wasatch-Cache National Forest, Region 4 of the Forest Service, surveyed additional tributaries throughout the range of the Bonneville cutthroat trout. The main purpose for conducting these surveys was to identify fish species compositions of streams on the forest. A secondary purpose was to take up to 30 cutthroat trout to determine genetic purity. Other information which was hoped could be acquired was a population estimate for fish within the stream and age class distribution of the population.

The streams, sampled (Table 1) on the Wasatch-Cache National Forest, were selected by Forest staff. Working with a Forest Service seasonal crew and Utah Division of Wildlife Resources the streams were sampled to determine species composition. Whole fish were taken and, where possible, a population estimate made.

## METHODS

Crews sampled at least one location on each stream surveyed. Crews consisted of two to three people. One person ran the electrofishing equipment and, depending on the individual, may also have assist in netting fish. The second person was a netter and a third person was a netter and also carried a bucket to hold captured fish. A string line or a measuring tape was used to determine the ending point of the 100 M section sampled. All possible attempts were made to locate sampling sections where a crew, in future years, could relocate and resample the same stream sections.

The sample sections were approximately 100m in length and started and ended at distinguishable habitat breaks. All side channels were sampled within this length of stream section. Fish collected within the sampling section during each pass were placed in a bucket of fresh water until weight and total lengths could be determined. Fish collected for genetic analysis were handled per Division procedures will not be reviewed here.

A population estimate was made for each section, where possible. Some populations were not estimated because the sampling assumptions were violated. The assumptions for making population estimates are: (1) equal sampling efforts, (2) the probability of capture for any individual in the population is equal, and (3) the population is closed, no movement, deaths or births occur during or between sampling efforts (White et al. 1982). The probability of capture for any individual is also

Table 1. Sampling location for streams surveyed for fish on the Wasatch-Cache National Forest in 1998 and township (T), range (R) and section (Sec) where sampled.

Drainage Creek	BASIN County	Sample Location
BONNEVILLE BASIN		
MILL CREEK		
LOST DOG	SUMMIT	T2N,R10E,Sec12
CHRISTMAS TREE CREEK	SUMMIT	T2N,R11E,Sec6-7
BEAR RIVER		
HIGH CREEK	CACHE	T15N,R2E,Sec10,11, 14,23,25,26
CHERRY CREEK	CACHE	T14N,R2E,Sec27
LITTLE BEAR CREEK	CACHE	T13N,R3E,Sec12
BUNCHGRASS CREEK	CACHE	T13N,R3E,Sec2,3
TEMPLE FORK	CACHE	T13N,R3E,Sec35
OGDEN RIVER		
BURCH CREEK	WEBER	T6N,R1E,Sec13
GREAT SALT SALT		
HOLMES CREEK	DAVIS	T4N,R1W,Sec25
JORDAN RIVER		
BIG COTTONWOOD CREEK	SALT LAKE	T2S,R3E,SEC35
S=SOUTH, N=NORTH, E=EAST, W=WEST		

suppose to be equal between passes. Riley and Fausch (1992) found that this may not always be the case. They suggest that at least three passes be done to test capture probability. In most situations only two passes were conducted because of limited money, time and other resources.

Fish populations were estimated for fish 100mm and over. The probability of capturing fish under 100mm is believed to be too low to make an accurate estimate. With electrofishing the larger the fish, the higher the probability of capture (White et al. 1982). Fish under 50mm were assumed to be age 0 fish. Fish from 51 to 100mm were believed to be age 1 fish. It is realized that in many situations, because of local environmental factors, this generalization may not hold true.

The calculations used to make the population estimate was:

$$N = U1/(1-(U2/U1))$$

where

N = population estimate for the section sampled

U1 = fish captured during the first sample

U2 = fish captured during the second sample

The probability of capture (P) is estimated by using:

$$P=1-(U2/U1).$$

Results from calculations using this formula suggest that if more fish are captured during the second pass than the first pass, a violation of the assumptions has occurred, the population estimate is of no value. Also if no fish are captured during a second pass a capture probability of 100 has occurred and all fish in the population have theoretically been captured. An upper and lower bound was placed on the population estimate. The formula used was:

$$CI=N\pm 1.96\sqrt{N*P*(1-P)}$$

where:

CI = 95% confidence interval.

In some cases the lower confidence limit was below the number of fish taken from a survey reach. In such cases the lower limit was set as the number of fish, 100mm and longer of a particular species, captured from the stream section.

## RESULTS

Ten streams within the Bonneville Basin were surveyed, for species compositions, on the Wasatch-Cache National Forest in 1998 (Table 1). All streams contained water at the time of sampling. Upper High, Cherry and Holmes creeks had sufficient water, but no fish were collected on forest. The other streams were composed of a number of fish species (Table 2).

Table 2. Streams surveyed on the Wasatch-Cache National Forest in 1998 and fish species found in sampling sections.

Drainage Stream	Fish Species
BONNEVILLE BASIN	
MILL CREEK	
LOST DOG	CUT
CHRISTMAS TREE CREEK	CUT
BEAR RIVER	
HIGH CREEK (UPPER)	FISHLESS
CHERRY CREEK	FISHLESS
LITTLE BEAR CREEK	CUT, BRN
BUNCHGRASS CREEK	CUT
TEMPLE FORK	CUT, BRN
OGDEN RIVER	
BURCH CREEK	RBT
GREAT SALT LAKE	
HOLMES CREEK	FISHLESS
JORDAN RIVER	
BIG COTTONWOOD CREEK	BKT, CUT, MTS
CUT=CUTTHROAT TROUT, BKT=BROOK TROUT, RBT=RAINBOW TROUT, SCU=SCULPIN, BRT=BROWN TROUT, MTS=MOUNTAIN SUCKER	

#### Bear River Drainage

##### Lost Dog Creek

Lost Dog Creek is located in the Mill Creek Drainage of Summit County, Utah. Only the headwaters of Lost Dog Creek are found on the Wasatch-Cache National Forest. Lost Dog Creek is a tributary of Mill Creek, in the Bear River Drainage. No survey section was identified on Lost Dog Creek because of the number of side channels. Water temperature at the time of electrofishing the section was 15°C (59°F) at about 10:00 on the morning of 27 July 1998. The section consisted of 100% cutthroat trout. A total of 5 cutthroat trout were captured during the survey. Two of these were captured above the road and three were captured from below the North Slope Road. The total length of the cutthroat trout captured ranged from 165 to 276mm and averaged 220.6mm (8.7in.). They weighed from 48g to 217g and averaged

117.8g (4.6oz.). This section of Lost Dog Creek consists primarily of age 3 and older fish, as distinguished by length (Figure 1).

#### Christmas Tree Creek

Christmas Tree Creek is located in the Mill Creek Drainage, Summit County, Utah. The stream was surveyed above the North Slope Road. No fish were collected. Below the road and adjacent to an old tie hack cabin a single cutthroat was collected. This was about 300m below the North Slope Road. No measurement were collected from the fish. Most of this stream below the road are off National Forest Lands.

#### High Creek

High Creek Drainage is located just south of the Idaho Border and east of the town of Lewiston, Cache County, Utah. Only the headwaters of High Creek are found on the Wasatch-Cache National Forest. High Creek is a tributary of the Cub River, in the Bear River Drainage. The survey crew hiked from Tony Grove Lake over the top and into High Creek Lake. The stream was spot surveyed from this point downstream to the trailhead. No fish were encountered until the mouth of Little Left Hand Fork. Because of the proximity to the trailhead sample made in 1997 no sample was taken.

#### Cherry Creek

Cherry Creek is a tributary to the Cub River and drains just north of Richmond in Cache County, Utah. The survey started at the end of the road and went upstream to where the stream forks at the elevation of 6788 feet. No fish were collected. There was, however, sufficient habitat and water in the section to meet fish needs.

#### City Creek

City Creek, a tributary to the Cub River, and goes through the town of Richmond. The road no longer goes up the stream. The stream was not surveyed because of this lack of access to the Forest and the stream. The stream is identified as an intermittent stream. There was some water left in the stream in T14N,R1E,Sec36,SE1/4.

## Little Bear Creek

Little Bear Creek is a tributary of the Logan River, Cache County, Utah. The survey was to locate fish which had been tagged over the last 5 years. Of the 33 fish were collected, two of these were brown trout and 31 were cutthroat trout. Water temperature at the time of electrofishing was 8°C(46°F) at about 11:30 on the morning of 12 June 1998.

The total length of the cutthroat trout captured ranged from 118 to 337mm and averaged 253mm (10.0in.). They weighed from 18g to 179g and averaged 179.6g (6.3oz.). The one cutthroat trout which was tagged was a cutthroat trout 270mm long and weighted 221g. It's tag was 978. This fish was tagged in 1995 and was 230mm long and weighted 156g.

The total length of the brown trout captured ranged from 146 to 212mm and averaged 179mm (7.0in.). They weighed from 36g to 89g and averaged 62.5g(2.2oz.).

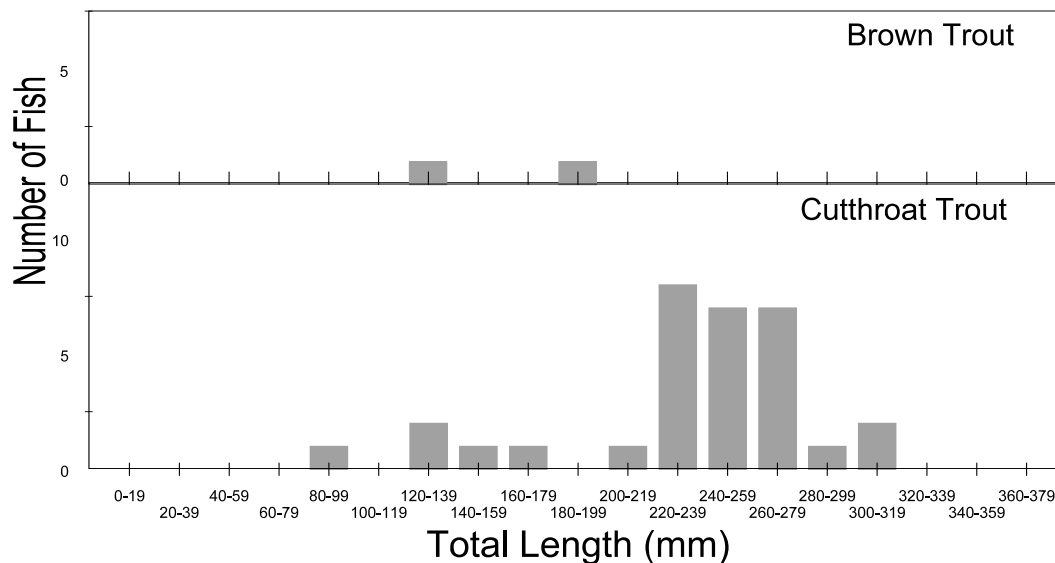


Figure 1. Length frequency of fish collected from Little Bear Creek, Logan River, Cache County, Utah, in 1997.

## Bunchgrass Creek

Bunchgrass Creek is a tributary of the Logan River, Cache County, Utah. The survey was to locate fish which had been tagged over the last 5 years. All 23 fish collected were cutthroat trout. Water temperature at the time of electrofishing was 12.8°C(55°F) at about 1:30 on the afternoon of 12 June 1998.

The total length of the cutthroat trout captured ranged from 53 to 317mm and averaged 193.5mm (7.6in.). They weighed from 1g to 345g and averaged 113.8g (4.0oz.). No tagged cutthroat trout were recaptured.

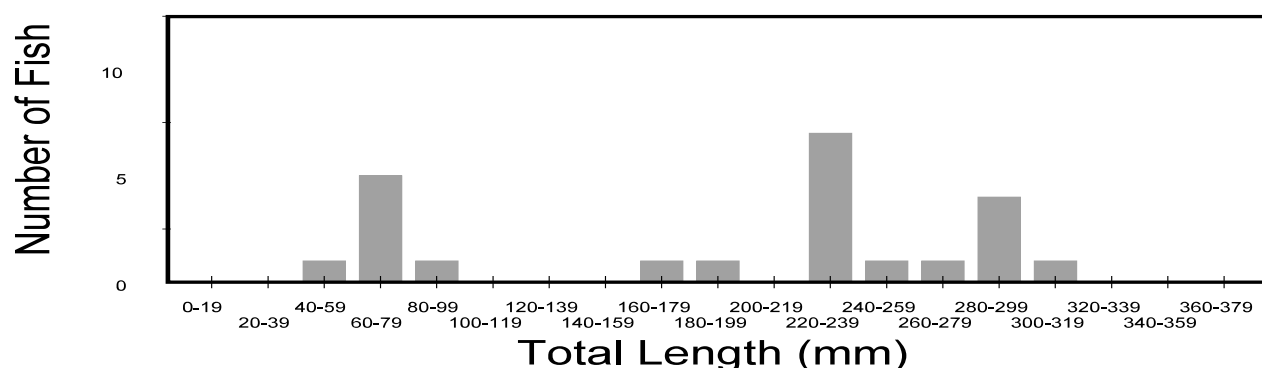


Figure 2. Length frequency of fish collected from Bunchgrass Creek, Logan River, Cache County, Utah, in 1998.

## Temple Fork

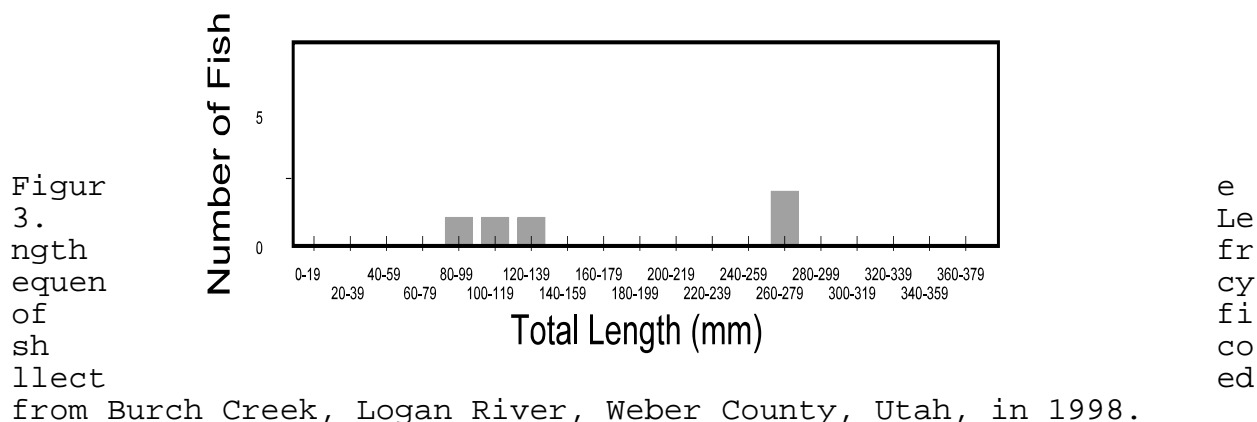
Temple Fork is a tributary of the Logan River, Cache County, Utah. The survey was a spot survey used to better inform and show a review team the species difference. This was done on the 21 of May 1998. Two cutthroat trout and one brown trout was captured. The cutthroat trout were 183 and 268mm long and weighted 73 and 189grams, respectively. The brown trout was 187 mm long and weighted 69g.

## Weber River

### Burch Creek

Burch Creek is a tributary of the lower Weber River, Weber County, Utah. The survey sections started approximately 1.5 miles upstream of Ridgedale Drive road crossing. No fish were

seen or captured for approximately 1.25 miles. A previous rumor that cutthroat trout was found to be inaccurate. Rainbow trout from one pool were collected and measured. They ranged from 97 to 271mm and averaged 172.0mm (6.8in.). They weighed from 9g to 261g and averaged 101g (3.6oz.).



### Great Salt Lake

#### Holmes Creek

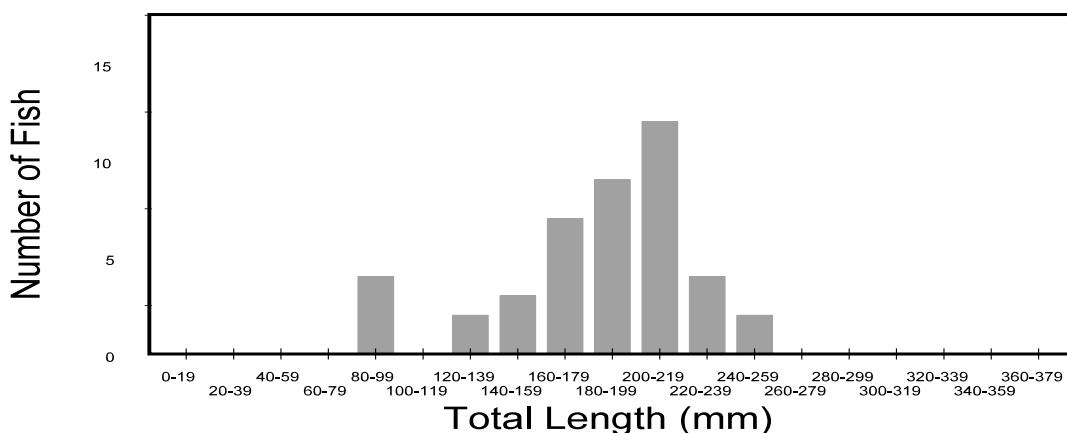
Holmes Creek is a tributary to the Great Salt Lake and is located just east of Layton. This tributary was surveyed on August 18, 1998. The survey reach was located at the diversion dam adjacent to the water tank and went upstream 100 meters. No fish were collected.

### Jordan River Drainage

#### Big Cottonwood Creek

Big Cottonwood Creek is a tributary of the Jordan River. Adjacent to Big Cottonwood Creek, on Forest, there are two ski resorts, a power plant and a mix of recreational facilities both private and public. One survey section was surveyed in 1998. On August 19, 1998 the stream temperature was 8.9°C (48°F). The

section started at the upstream side of the culvert6 under the Millicent Lift and went upstream 100m. Fish in this section consisted of 1 (2%) rainbow trout, 1 (2%) mountain sucker and 43 (96%) brook trout. The rainbow had a total length of 216mm and



weighted 100g. The mountain sucker was 130mm long and weighted 23g. The brook trout ranged in size from 88 to 240mm and averaged 184.5mm (7.3 inches). They weighted 8 to 129g and averaged 72.3g (2.5oz). The population estimate for brook trout, 100mm and over, in this section was 39 and ranged from 38, the number of fish captured, to 43 fish.

Figure 4. Length frequency of fish collected from Big Cottonwood Creek, Salt Lake County, Utah, in 1998.

## **OPPORTUNITIES AND RECOMMENDATIONS**

Opportunities mean many different things to different people. In this report, I have viewed opportunities from a fish management perspective. Ecosystem management principles would suggest that we manage for all resources so as to not lose any one part. In this report I have dealt with mainly fish issues or

habitat issues which were obvious at a glance. No habitat surveys were conducted to identify specific habitat projects which could be implemented to improve fish habitat.

Eight streams were surveyed on the Wasatch-Cache National Forest in 1997 (Table 1). All streams contained water at the time of sampling. Upper High, Cherry and Holmes creeks had enough water to support fish but no fish were located during the survey. The other streams were composed of a number of fish species (Table 2).

### Bear River Drainage

#### Lost Dog Creek

The Lost Dog Creek population could be improved by increasing fish passage under the North Slope Road. The existing culvert currently appears to be under sized because of the resulting downstream erosion as water is constricted through the culvert. This improvement would be in the way of a culvert replacement with a larger culvert.

#### Christmas Tree Creek

No improvement actions were identified for Christmas Tree Creek.

#### High Creek

The High Creek Drainage has a number of improvement opportunities. Most of these are associated with the trail which goes up the bottom of the drainage. Sedimentation continues to be a problem from the trail. Proper drainage would significantly reduce sedimentation and improve the trail.

#### Cherry Creek

No improvement actions were identified for Cherry Creek.

#### City Creek

No improvement actions were identified for City Creek. Access into this stream could be improved.

## Little Bear Creek

Little Bear Creek could be improved through the removal of the road and culvert near the mouth of the stream. There is also great concern in finding two brown trout in the drainage. Required removal of this non-native species should be strongly considered.

## Bunchgrass Creek

Improvements in the Bunchgrass Creek Drainage would include correction of a few of the trail crossings to narrow the stream and increase the stream depth.

## Temple Fork

The road up Temple Fork is currently being relocated out of the bottom of the drainage. This includes shifting all of the camping and vehicle traffic out of all most 4 miles of Temple Fork and Spawn Creek. Over the next two years the old road will be modified to allow for the restoration of riparian vegetation and sediment reduction.

## Weber River

### Burch Creeks

The primary opportunity to improve conditions up Burch Creek is to move the trail out of the bottom of the drainage. The existing trail is poorly designed and includes a number of stream crossings with few erosion structures.

## Great Salt Lake

### Holmes Creek

No improvement actions were identified for Holmes Creek. Access into this stream could be improved.

## Jordan River Drainage

### Big Cottonwood Creek

Big Cottonwood Creek, in the sections surveyed, could be improved through reducing litter in the stream. As with most recreational facilities along the Wasatch Front, litter in the water channels appears to be a constant problem. This is primarily an acetic problem.

## **GENERAL**

Over the past five years the majority of the streams on the Wasatch-Cache National Forest, in the historic range of the Bonneville cutthroat trout, have been surveyed for species composition. Staff of Wasatch-Cache National Forest and Utah Division of Wildlife Resources have surveyed 96 streams in the historic range of the Bonneville cutthroat trout on the Wasatch-Cache National Forest. Fourteen additional streams have yet to be surveyed, with most of these being small steep headwater streams along the Wasatch Front. Of the streams surveyed, 18 were fishless. Of the 78 streams containing fish, 9 (12%) contained only nonnative trout, 31 (40%) contain a mix of cutthroat and nonnative trout, and 38 (49%) contain cutthroat trout (Cowley 1995, Cowley 1996, Cowley 1997a, Cowley 1997b). It should be remembered that merely because cutthroat trout were collected this does not suggest that these fish are pure Bonneville cutthroat trout. The cutthroat trout collected may be pure Bonneville, pure Yellowstone or a mix of Bonneville and Yellowstone, and Colorado River cutthroat trout or rainbow trout. At first glance one may say that native fish are not of concern. However, when one considers that nonnative fish are present in more than 52% of the streams surveyed and full replacement has occurred in 12% of the stream, nonnative trout should be recognized as a real threat. Land management activities also threaten cutthroat trout populations. These may include bank trampling of livestock and people, improper timber harvest, poor road construction and maintenance techniques. Recreation activities also threaten native populations which include fishing, camping, site seeing and four-wheeling. Efforts need to be made to better balance society needs and yet maintain these unique fish.

## **OTHER FOREST ACTIVITIES**

Additional activities which have occurred on the Forest. These should benefit Bonneville cutthroat trout and include:

1. The Temple Fork Road is being relocated upslope away from Temple Fork. The new road has been cut in and should be

finished in 1999. The existing road should be rehabilitated during the next few years. This action is being done in the Logan River meta-population area.

2. Two Highway 89 bridges, in Logan Canyon, have been replaced with wider, safer structures. This should minimize potential accidents which could spill contaminants into the river at the bridge crossings.
3. The North Slope Road has been narrowed adjacent to North Mill Creek. The road was narrowed by approximately 8 feet and addition drainage structures were installed. This should significantly reduce sedimentation entering North Mill Creek and going downstream into Mill Creek.

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## APPENDIX

Photo 1. Looking west down Cherry Creek.



Photo 3. Rainbow trout taken from Burch Creek, 1998



Photo 2 Temple Fork Road relocation. Note the new road location on the left of the photo and the old road location next to the stream.



Photo 3. Burch Creek, Weber County, 1998.





Photo 5. Holmes Creek looking through diversion gate, 1998. This was the start of the sample section. No fish collected.



Photo 6. Cutthroat trout collect from Big Cottonwood Creek, 1998.